Claims:

1. A process for the preparation of an olefin polymer which comprises effecting olefin polymerisation under essentially constant conditions in a single reactor in the presence of a catalyst system comprising a support material coimpregnated with at least two metallocene olefin polymerisation catalysts having different propensities for incorporation of polymer chain defects, said metallocenes being selected to produce an olefin polymer comprising at least a higher molecular weight fraction and a lower molecular weight fraction, wherein the polymer chain defect content of said higher molecular weight fraction is at least 3 times that of said lower molecular weight fraction.

2. A process as claimed in claim 1 wherein said metallocenes are selected so that the polymer chain defect content of said higher molecular weight fraction is at least 10 times that of said lower molecular weight fraction.

3. A process as claimed in claim 1 or claim 2 wherein at least one of said metallocenes comprises a group 4 metal.

4. A process as claimed in claim 3 wherein the catalyst system comprises at least a first metallocene selected from rac-dimethylsilyl bis(2-methyl-4-phenylindenyl)zirconium dichloride, bis(n-butylcyclopentadienyl)hafnium dichloride, ethyl bis(1-indenyl)hafnium dichloride and rac-dimethylsilyl bis(9-fluorenyl)zirconium dichloride and a second metallocene selected from bis(pentamethylcyclopentadienyl)zirconium dichloride, bis(n-butylcyclopentadienyl)zirconium dichloride and dimethylsilyl bis(9-fluorenyl)zirconium dichloride.

SUB A3

5. A process as claimed in any preceding claim wherein the catalyst system further comprises a cocatalyst.

6. A process as claimed in claim 5 wherein said cocatalyst is methyl aluminoxane.

SUB A4

7. A process as claimed in any preceding claim wherein the support material is porous particulate silica.

8. A process as claimed in any preceding claim wherein ethylene or propylene is polymerised.

9. A process as claimed in claim 8 wherein polymerisation is effected in the presence of an α-olefin comonomer containing up to 10 carbon atoms.

10. A process as claimed in claim 9 wherein ethylene is copolymerised with 1-hexene.

SUB A5

11. A process as claimed in any preceding claim wherein the product is subsequently subjected to at least one further polymerisation reaction.

12. A process as claimed in claim 11 wherein said further polymerisation reaction comprises a process as defined in claim 1.

13. A polyolefin having essentially complete particle to particle homogeneity and comprising at least a higher molecular weight fraction and a lower molecular weight fraction, wherein the polymer chain defect content of said higher molecular weight fraction is at least 3 times that of said lower molecular weight fraction.

14. A polyolefin as claimed in claim 13 wherein the polymer chain defect content of said higher molecular weight fraction is at least 10 times that of said lower

molecular weight fraction.

15. A polyolefin as claimed in claim 13 or claim 14 wherein the polymer chain defects are selected from side chains and crystallinity disrupting monomer units.

16. A polyolefin as claimed in claim 15 wherein the polymer chain defects comprise comonomer-derived short chain branches.

17. A polyolefin as claimed in claim 15 or claim 16 wherein the polymer chain defects comprise long chain branches containing at least 10 monomer units.

18. A polyolefin as claimed in claim 17 wherein said long chain branches are essentially homopolymeric.